PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hiromitsu TAKEDA et al.

Application No.: 10/544,373

Filed: April 20, 2006

Group Art Unit: 1793

Examiner: N. D'ANIELLO

Docket No.: 124713

For: FINE PARTICLE DISPERSION OF INFRARED-SHIELDING MATERIAL, INFRARED-SHIELDING BODY, AND PRODUCTION METHOD OF FINE PARTICLES OF INFRARED-SHIELDING MATERIAL, AND FINE PARTICLES OF INFRARED-SHIELDING MATERIAL

DECLARATION UNDER 37 C.F.R. §1.132

I, Kenji ADACHI, a citizen of Japan, hereby declare and state:

1. I have a Ph.D. degree in Metallurgical Engineering and Materials Science which was conferred upon me by the Department of Materials Science and Engineering at the University of Illinois at Urbana-Champaign in 1983.

2. I have been employed by Sumitomo Metal Mining Co., Ltd. since 1985 and I have had a total of 25 years of work and research experience in functional materials development and 17 years in nanoparticulate materials development.

3. I am a named inventor in the above-captioned patent application.

4. I have a professional relationship, as an employee, with an assignee of the above-identified patent application. In the course of that professional relationship, I receive compensation directly from the assignee for my work relating to nanoparticulate materials development. I am not being compensated for my work in connection with this Declaration, aside from my compensation as an employee.

5. I have reviewed and analyzed JP 2000-233929 A to Inoue et al. ("Inoue"), and am familiar with the contents thereof.

6. In particular, I understand that Inoue describes a fine particle powder of the formula $V_{(1-x)}O_2M_x$, where M is W and/or Mo and x is said to be 0.7 to 2.7. However, x cannot be more than 1 in Inoue, and thus the teachings in Inoue are not correct, as detailed below.

7. Mathematically, the formula $V_{(1-x)}O_2M_x$ in Inoue can be correct only where x is greater than zero and less than one ($0<x<1$). $x>1$ would require V to be present in negative amounts, an impossibility.

8. I understand the Patent Office has thus assumed that Inoue describes particles where $0.7<x<1$. However, this is not founded, as the Examples in Inoue indicate that x is actually much less than 0.7. The Examples, as discussed below, thus indicate that the entirety of the description of x is incorrect in Inoue.

9. Inoue describes examples of powders represented by the formula $V_{(1-x)}O_2M_x$ where x = 0.0072 to 0.0223 (approximately) as confirmed by the following calculations:

The Examples of Inoue describe mixed powders of VO_2 and WO_3 containing 2, 4 and 6 wt% of WO_3. The molecular weights of WO_3 and VO_2 are calculated to be 231.8382 and 82.9408, respectively.

Where WO_3 is 2 wt% of powder, the number of moles of VO_2 in 100 grams of mixed powder is 98 g / 82.9403 = 1.181573 moles and the number of moles of WO_3 in 100 grams of mixed powder is 2 g / 231.8382 = 0.008627 moles. Accordingly, the molar ratio of VO_2 to WO_3 is (1-x) / x is 1.181573:0.008627. Thus, x = 0.007248.

Where WO_3 is 4 wt% of powder, the molar ratio of VO_2 to WO_3 is (1-x) / x is 1.157459:0.017253. Thus, x = 0.014687.

Where WO_3 is 6 wt% of powder, the molar ratio of VO_2 to WO_3 is (1-x) / x is 1.133345:0.02588. Thus, x = 0.022325.

Taking these calculations together, it is evident that the powders described by Inoue are more accurately represented by the formula $V_{(1-x)}O_2M_x$ where x = 0.0072 to 0.0223 (approximately). Therefore, Inoue's recitation of x = 0.7 to 2.7 is either a miscalculation or typographical error.

Putting the molar ratio of VO_2 to WO_3 in terms of x / y where WO_3 is 2 wt% of powder, the term x / y = 1.181573 / 0.008627 = 136.9669.

Putting the molar ratio of VO_2 to WO_3 in terms of x / y where WO_3 is 4 wt% of powder, the term x / y = 1.157459 / 0.017253 = 67.0858.

Putting the molar ratio of VO_2 to WO_3 in terms of x / y where WO_3 is 6 wt% of powder, the term x / y = 1.133345 / 0.02588 = 43.7921.

Therefore, the range of molar ratios of VO_2 to WO_3 in terms of x / y taught by Inoue is from about 43.8 to about 137.0.

10. While the calculations above do not take into account any potential variations based on, for example, potentially different ionic states of tungsten, the possibility that some of the materials may be lost in processing, etc., the calculated values of x and the calculated molar ratio of x/y are a reasonable approximation of the actual values.

11. Based upon the calculated values described above, the compositions described by Inoue would not be expected to have the unique and desirable characteristics of the fine particle dispersions of the present application. For example, the fine particle dispersions of this application achieve a chemically stable infrared screening effect by generating a sufficient quantity of free electrons, while avoiding the generation of an impurity phase. The fine particle dispersions of this application are defined as having a range of x/y values of from

0.001 to 1. It is only within this range that the fine particle dispersions have the desired characteristics.

12. It would not have been possible, at the time of this invention, to have derived the fine particle dispersions of this application from the teachings of Inoue as a whole. This is because the formula recited by Inoue is clearly erroneous, and the Examples describe compositions having x/y values of from about 43.8 to about 137.0. These x/y values are completely out of the range of those required for the fine particle dispersions of the present claims.

13. I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and/or imprisonment under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.

Date: April 30, 2009

Dr. Kenji Adachi